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LOW FRICTION FABRIC

FIELD OF THE INVENTION

This invention relates to a fabric designed to minimize shear forces. It has both medical and recreational applications.

BACKGROUND OF THE INVENTION

The formation of calluses is primarily a result of friction. As the layers of skin are loaded in a shearing fashion, the planes of skin separate. This leads to blistering in the space between layers. With further progression of shear loads, the upper layer or layers of skin can be traumatized to the point where it separates from the deeper layers. This results in painful, raw, exposed dermis. In addition to the pain associated with exposure to these deeper layers, there is a danger of progression of the sore as successive layers are forcefully torn away. Ultimately, this can lead to open sores called ulcers. Ulcers occur when the depth of the wound has advanced through the epidermis, dermis, and into the subcutaneous fat layer. This layer is highly vascular, and susceptible to infection.

Separation of layers of skin that led to this destructive process is a result of mechanical forces. In particular, the skin structure can be traumatized by vertical forces, perpendicular to the skin, or by shear forces, in the same plane as the skin, with shear forces being the primary culprit. It is these excessive shear forces that are the primary mechanical cause of various skin pathologies and a

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ABSTRACT OF THE DISCLOSURE

A low friction fabric constructed of a first layer of woven polyester fibers with an upper and lower woven surface attached to and adjacent a second layer of the same weave of polyester fibers, the second layer having an upper and lower surface. Each of the woven layers comprising a straight yarn in the warp of the weave pattern with the weaves of the layers being oriented at a 90 degree angle to one another.

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Separation of layers of skin that led to this destructive process is a result of mechanical forces. In particular, the skin structure can be traumatized by vertical forces, perpendicular to the skin, or by shear forces, in the same plane as the skin, with shear forces being the primary culprit. It is these excessive shear forces that are the primary mechanical cause of various skin pathologies and a contributing factor to the failure of medical treatment modalities such as skin grafts. For many people excessive shear force is the primary cause of blistering during day-to-day activities and during high impact activities that occur in many sports. An interface that is capable of reducing or eliminating shear forces would greatly reduce the potential for formation of blisters, and reduce the risk of subsequent ulcers and infection. This is particularly a problem in many medical conditions where the patient has reduced sensitivity as a result of disease or medical procedure. These patients may be unaware of the formation of such skin lesions or ulcers until they are quite advanced. In fact, the leading cause of non-traumatic amputation of a leg or foot is infection following ulcer formation in diabetic patients with neuropathy. In the US alone, nearly 60,000 ~~amputation~~ amputations are performed annually due to non-healing ulcers, with an annual cost in excess of $2 billion.

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Likewise, with athletic equipment, such as socks, the problem of blistering after extended periods of activity is well known.[[.]] When an athlete endures high physical stress, the magnitude and frequency of the skin rubbing against the inner surface of a sock or other high-impact area, is increased when compared to normal daily activity. Thus, the blistering caused by such shearing forces is a common

ailment of many athletes. The ability of a sock to prevent this blistering has been heretofore limited to different materials and weaves, principally for the purpose of providing cushioning. Providing a sock with reduced shear forces is unknown. The same is true of gloves, points of contact with various padding, and other athletic equipment.

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Although this is an important breakthrough for all athletic individuals, or those that do a great deal of walking and running, the population which is most likely to benefit from this breakthrough are those with neuropathy. Peripheral sensory neuropathy reduces a person's ability to feel their feet. Consequently, they are not aware when a blister forms, or progresses to the point of ulceration, until blood is observed in a sock or on the floor. These individuals do not have the ability to detect when their skin has been injured. As a result, they continue to carry on with their normal activities until the breakdown of skin is so severe that they are at risk for deep infections.

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The present invention provides these advantages by placing two fabric layers at an [[angel]] angle to each other to create a reduced friction cloth. A woven fabric is composed of two yarns, interlocking from two directions. As you look at a piece of cloth, the fibers that are running the length of the cloth are [[know]] known as the warp yarns and the fibers running perpendicular to these are [[know]] known as the weft yarns. The long sides of the fabric are the selvage ends. These finished ends are made by the weft yarns turning around to weave back through the warp.

Two layers of such a weave fabric are combined to produce the reduced friction cloth. By adjusting the [[angel]] angle at which the layers are related, an increase or decrease of the friction between the layers can be achieved. Tests indicate that a maximum friction is achieved when the weaves are oriented in parallel, and a minimum ~~fiction~~ friction is achieved when the weaves are orthogonal.

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1. (Currently Amended) A low friction fabric ~~consisting of~~ comprising a first layer of woven material with an upper and lower ~~identical~~ woven surface attached comprising at least two different types of yarn to a second layer of woven material of the same weave, said second layer having ~~with~~ an upper and lower ~~identical~~ woven surface comprising at least two different types of yarn, said fabric layers being in contact with ~~where the entire~~ said lower surface of said first layer having a weave of a first orientation contacting ~~is in contact with~~ the entire said upper surface of said second layer, said second layer having a weave with a second orientation octagonal to the orientation of the weave of said first layer to reduce the coefficient of friction between the layers ~~and a means of securing said combined layers to third object~~.

2. (Canceled)

3. (Canceled)

4. (Currently Amended) The low friction fabric of claim ~~2 where said means~~ 1 wherein said fabric is constructed as a sock.

5. (Currently Amended) A low friction fabric ~~consisting of~~ using two different types of yarn to achieve a smooth side and a rough side comprising a first layer of woven polyester fibers with an upper and lower ~~identical~~ woven surface attached to and adjacent a second layer of the same weave

of woven polyester fibers[[,]] ~~with~~ said second layer having an upper and lower ~~identical~~ surface, ~~where the entire~~ each of said woven layers comprising a weave with a straight yarn in the warp of the weave pattern and a low twist yarn in the weft of the weave pattern, said lower surface of said first layer [[is]] being in contact with the [[entire]] said upper surface of said second layer ~~and where~~ with the ~~weaves~~ weft yarn of said layers ~~are place~~ oriented at a 90 degree angle to one another., ~~and a means of securing said combined layers to a particular portion of the human body~~

6. (Canceled)

7. (Currently Amended) The low friction ~~material~~ fabric of claim 5 ~~where~~ wherein ~~the said means~~ said fabric is constructed as a sock.

8. (New) The low friction fabric of claim 1 wherein said fabric is a bandage.

9. (New) The low friction fabric of claim 5 wherein said fabric is a bandage.

10. (New) The low friction fabric of claim 1 wherein said fabric is constructed as a shoe insert.

11. (New) The low friction fabric of claim 5 wherein said fabric is constructed as a shoe insert.

12. (New) A low friction fabric as claimed in claim 5 wherein said woven fabric is an over four under one weave.

13. (New) A low friction fabric as claimed in claim 1 wherein said woven fabric is an over four under one weave.

14. (New) A low friction fabric comprising a first layer of woven polyester fibers having an over four under one weave with an upper and lower surface attached to a second layer of woven polyester fibers having an over four under one weave with an upper and lower surface, each of said layers comprising a straight yarn in the warp of the weave pattern and a low twist yarn in the weft of the weave pattern, said lower surface of said first layer being in contact with said upper surface of said second layer with the weft yarn of said layers being oriented at a 90 degree angle to each another.

15. (New) The low friction fabric of claim 14 wherein the fabric is constructed as a sock.

16. (New) The low friction fabric of claim 14 wherein said fabric is as a bandage.

17. (New) A low friction fabric comprising a first layer of woven material with an upper and lower woven surface attached to a second layer of woven material of the same weave, said second layer having an upper and lower woven surface, said fabric layers being in contact with said lower surface of said first layer having a weave of a first orientation contacting the entire said upper surface of said second layer, said second layer having a weave with a second orientation octagonal to the weave of said first layer to reduce the coefficient of friction between the layers, said fabric is constructed as a shoe insert.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an exploded schematic showing the top of the material with shear force applied thereto with the bottom surface fixed;

Figure 2 is a cross sectional view the fabric of the present invention with the layers placed in orthogonal relationship;

Figure 3 is an enlarged planar schematic view of the fabric of the present invention showing an over four under one pattern weave;

Figure 4 is a schematic representation of the shear forces applied in an X side by side and Y front to back relationship with respect to the force collection plate on which testing was undertaken;

Figure 5 is an exploded representation of the two layers of fabric with the weave oriented and attached to form the low friction fabric;

Figure 6 is both an exploded and top plan view of a shoe insert or insole and an exploded bottom plan view of a sock;

and

Figure 7 is a bottom plan view of a bandage using the low friction fabric of the present invention.